DC1333

Testing of Baier Plasterboard to AS/NZS 2588

(Electronic copy (PDF format) – original signed by author)

Author: **Neil Lee**
Materials Scientist

Reviewer: **Bryan Keen**
Senior Technician

Contact:
BRANZ Limited
Moonshine Road
Judgeford
Private Bag 50908
Porirua City
New Zealand
Tel: +64 4 237 1170
Fax: +64 4 237 1171
www.branz.co.nz

CONDITIONS OF ISSUE OF BRANZ REPORTS

The issue of this Report is subject to the conditions set out below:

Rights

- BRANZ reserves all rights in the Report. The Report is entitled to the full protection given by the New Zealand Copyright Act 1994 to BRANZ. Except as specified below, the client shall not publish any part of a Report.
- The Client will have no rights to use a Report unless full payment of the fees has been made to BRANZ.

Publication of Reports

- The Client shall accurately report any information from BRANZ and shall indemnify BRANZ against any damages related to misrepresentation.
- If the Client has proprietary rights to an Item reported on (e.g. is the manufacturer, accredited agent of the manufacturer, owner), the Client may:
  a) publish the Report verbatim and in full, or
  b) state that the Item has been the subject of a Report by BRANZ, provided a full copy of the Report is provided to any third Party requesting it. In New Zealand and Australia such reference to a Report is permitted in technical literature but not in advertising or electronic media, unless the item is BRANZ Appraised.*
- The CEO's prior written consent must be obtained before:
  a) any extract or abridgement of a Report is published.
  b) the Report is used in or referred to in connection with any company prospectus or publicly issued report.
- If the client does not have proprietary rights to an item, the CEO's prior written consent must be obtained before any reference to, extract from, or abridgement of a report is published.
- BRANZ reserves the right to confirm, to a third party, the validity of any written statement made by the Client which refers to a Report.
- A Report does not imply approval by BRANZ of any Item for any particular purpose and therefore no statement shall state or imply approval by BRANZ.

*In New Zealand and Australia BRANZ allows the use of the following means of referring to a BRANZ Report to support relevant technical claims in Technical Literature:

1. The publishing of a statement that the product has been the subject of a BRANZ Report, provided the statement includes the Report Number, date of issues and date of review.

or

2. The publishing of words of the Client's choice but only with the approval of BRANZ Chief Executive. Any alterations or amendments, or conditions imposed must be complied with.

(Technical Literature is defined as written material intended to support claims of compliance with a national Building Code and fitness for purpose. It would also be material containing, as a minimum, product specifications, installation instructions, and maintenance requirements.)

Testing of Baier Plasterboard to AS/NZS 2588

1. CLIENT

Asia Pacific Importers & Exporters
P.O. Box 21 384
Christchurch
New Zealand

2. SCOPE

Two sheets of nominal 2400 x 1200 x 9.5 mm 'Baier' brand plasterboard were supplied by the client for assessment against the performance requirements of ***AS/NZS 2588:1998 'Gypsum Plasterboard'*** [1], as specified by ***clauses 9.1.2 to 9.1.6*** of that Standard. Correct dimensional tolerances for board thickness (***clause 6.1***) and edge finish (***clause 7***) were also verified.

3. CAVEAT

While meeting the performance requirements specified in ***clauses 9.1.2 – 9.1.6*** of ***AS/NZS 2588:1988*** indicates the general fitness for purpose of gypsum plasterboard, the testing of an isolated sample is not sufficient for claiming compliance with ***AS/NZS 2588*** by a manufacturer or supplier. Full compliance also necessitates the consideration of full Statistical Sampling, Product Certification, Quality System auditing, or other appropriate quality assurance methods acceptable to the customer, as documented in ***Appendix A*** of the Standard.

BRANZ has no knowledge of the sampling criteria used to select the boards submitted for testing, nor how representative they are of the quality of Baier plasterboard as a whole or on a consistent or sustained basis. Consequently this report does not have the same weight as a formal product Appraisal, which addresses the requirements of ***Appendix A***.

Statements under this item 3 in no way limit any provision or requirement of the terms of engagement between BRANZ and the Client.

4. DESCRIPTION OF SAMPLES RECEIVED

The plasterboard was shipped on a wooden pallet, protected by sacrificial sheets, and received in good condition at the testing laboratory. The intended test sheets, assigned BRANZ Registry number 06/191, were marked with the following production information printed on the plasterboard paper liner:

- ***Baier 2006.08.16.01:33 (2)*** (subsequently designated '06/191 Sheet A')
- ***Baier 2006.08.16.01:34 (2)*** (subsequently designated '06/191 Sheet B')

No additional markings were present on the boards. The long sides of each plasterboard sheet were finished with a recessed (tapered) edge.

5. DESCRIPTION OF TEST PROCEDURES

The plasterboard testing was carried out in accordance with ***AS/NZS 2588***, with particular reference to ***Appendices B, C, D, E, F*** & ***G***. Following cutting of the appropriately sized pieces, all specimens were conditioned at 23ºC ± 2°C and 50% ± 5% relative humidity for six days prior to testing. All of the testing was carried out in a controlled environment room maintained at 23ºC and 50% R.H.

AS/NZS 2588 does not specify sampling frequency or a minimum number of boards to test. In this instance it was noted that the two boards were probably produced consecutively, with timestamps no more than 1 minute apart. Consequently there is likely to be minimal variability between them and all of the test specimens required to measure the mechanical properties were prepared from one board (sheet 'B'). The following tests were carried out:

5.1 Thickness – Appendix B: A calibrated Mitutoyo drum micrometer with 14 mm discs was used to take 5 measurements approximately 25 mm in from the cut edge of the plasterboard sheet.

5.2 Bending Strength – Appendix C [Method A]: Eight test specimens of dimensions 300 mm x 400 mm were cut from a sample sheet; four were cut with the 300 mm dimension parallel to the machine direction and four were cut with the 300 mm dimension perpendicular to the machine direction. Each specimen was placed on two 300 mm wide supports, spaced at 356 mm centres. An Instron Universal Testing machine with a calibrated 10 kN load cell was used to impose a vertical force uniformly across the full width of the specimen along a line parallel to the midway point between the supports. The cross-head loading speed was set at 25 mm/min. Of the four perpendicular specimens, two were tested 'face-up' and the remaining two 'face-down'. The parallel specimens were tested in a similar manner.

5.3 Edge Hardness – Appendix D: A test specimen measuring 300 mm x 100 mm was cut from a sample sheet incorporating a bound edge not less than 100 mm from a machine cut end. An Instron Universal testing machine with a calibrated 10 kN load cell was used to drive a 12 SWG stainless steel needle, with dimensions as specified, 4.75 mm into the plasterboard. The maximum load necessary to achieve this protrusion was recorded by the machine. This operation was repeated twice in the vicinity of the first measurement, the highest of these readings was then recorded. This process was again repeated a further two times for different areas of the bound edge of the board. The average of the three highest readings was then recorded.

5.4 Nail Pull Resistance – Appendix E [Method A]: Six test specimens of size 150 mm x 150 mm were cut from the middle of a sample sheet. A pilot hole was drilled through the centre of each test specimen to accommodate a standard test nail with a shank diameter of 2.5 mm and a head diameter of 6.4 mm. An Instron Universal testing machine with a calibrated 10 kN load cell was used to provide a cross-head rate of 25 mm/min. Each specimen was centred face-up on a base plate and the cross-head manually lowered until the shank of the test nail was located in the pilot hole. The maximum load (N) was then recorded for each test specimen and the average of all tests calculated.

5.5 Bond Strength in Tension – Appendix F: Three plasterboard pieces of dimensions 100 mm x 100 mm and three aluminium dollies of size 50 mm x 50 mm and a tube of Fullers' Sturdi-Bond construction adhesive were conditioned at a temperature of 23 ± 2°C and 50 ± 5% relative humidity for a period of 24 hours immediately preceding the preparation of the test assemblies. A spatula was used to apply adhesive to the base of the aluminium dollies to a wet thickness of 2 mm. Two 1 mm diameter wires were then placed across the plasterboard and the dollies centralised on each test specimen; a 7 kg weight was placed on top of the assembly and immediately removed. The spacers were then removed

and the excess adhesive carefully removed with a spatula. The test assemblies were then conditioned at a temperature of 23 ± 2°C and 50 ± 5% relative humidity for 24 hours. The load at failure of each assembly was carried out by loading in tension using an Instron Universal testing machine with a calibrated 10 kN load cell. The cross-head rate was set at 50 mm/min. The tensile force was then calculated in newtons required to rupture each of the three assemblies.

5.6 Humidified Deflection– Appendix G [Method A]: The 'Cantilever' method was used to carry out this test. One specimen was cut from a sample sheet which had a dimension of 100 ± 1 mm in the machine direction and 550 ± 1 mm in the perpendicular direction approximately on the centre-line and at 300 mm from the end of the sampled board. The test piece was securely placed on a level shelf face up in a Contherm™ environmental chamber set at 32 ± 2°C and 90 ± 3% relative humidity so the specimen over hung by 450 ± 1 mm; digital callipers were then used to measure the initial deflection of the plasterboard from a known datum. The sample was left to condition for a period of 24 hours before re-measuring the final deflection. The induced deflection was then calculated as the difference between the two measurements.

5.7 Edge Finish – Clause 7 & Figure 1. Three sections of plasterboard with wrapped recessed edge were selected from the pieces remaining after all specimens were cut for testing. The taper width was measured using a digital micrometer and a straightedge to establish the commencement of the taper. The taper depth was measured using Starrett® taper gauge and a granite surface table as a reference datum. Three measurements were taken for each specimen. The taper depth 10 mm in from the board edge was then calculated from the resulting profiles.

6. RESULTS

6.1 Board Thickness

Thickness – Appendix B		
Board	*Reading*	*Thickness (mm)*
A	(i)	9.84
	(ii)	9.89
	(iii)	9.86
	(iv)	9.85
	(v)	9.85
	Mean	***9.86***
	Standard Deviation	*0.02*
PASS		

According to Clause 6.1, permissible nominal thicknesses of plasterboard supplied in New Zealand are 9.5 mm, 12.5 mm, 16 mm or 19 mm. To comply, the thickness measurements must be within ± 0.5 mm of the nominated thickness.

6.2 Bending Strength

Bending Strength – Appendix C [Method A]			
Board	*Orientation*	*Perpendicular (N)*	*Parallel (N)*
B	face up	434	180
	face up	387	165
	face down	447	176
	face down	452	190
	Mean	***430***	***178***
	Standard Deviation	*30*	*10*
PASS			

When testing in accordance to Appendix C the standard requires a minimum breaking force of 360 N in the perpendicular direction and 150 N in the parallel direction, for a 9.5 mm or 10 mm thick board

6.3 Edge Hardness

Edge Hardness – Appendix D		
Board	*Reading*	*Highest Peak Load (N)*
B	(i)	103
	(ii)	99
	(iii)	98
	Mean	***100***
	Standard Deviation	*3*
PASS		

When testing in accordance to Appendix D, the gypsum plasterboard shall have an edge hardness exceeding 45 N.

6.4 Nail-Pull Resistance

Nail Pull Resistance – Appendix E		
Board	*Specimen*	*Peak Load (N)*
B	(i)	369
	(ii)	352
	(iii)	337
	(iv)	348
	(v)	351
	(vi)	354
	Mean	***352***
Standard Deviation		*10*
PASS		

When tested in accordance to Appendix E the gypsum plasterboard shell have a minimum nail pull resistance appropriate to its intended use: 270 N for walls (studs at max.600 mm centres), 270 N for ceilings (joists / furring at max. 450 mm centres), 300 N for ceilings (joists / furring at max. 600 mm centres).

6.5 Bond Strength in Tension

Bond Strength in Tension – Appendix F			
Board	*Reading*	*Peak Load (N)*	*Failure Type*
B	(i)	392	core cohesion
	(ii)	363	core cohesion
	(iii)	439	core cohesion
	Mean	***398***	
Standard Deviation		*39*	
PASS			

When tested in accordance to Appendix F, the bond strength in tension of the adhesive shall not be less than 250 N after drying.

6.6 Humidified Deflection

Humidified Deflection – Appendix G [Method A: Cantilever]				
Board	*Specimen*	*Initial (mm)*	*Final (mm)*	*Induced (mm)*
B	(i)	1.0	38.0	37.0
	(ii)	2.0	38.0	36.0
PASS				

When tested in accordance to Appendix G [Method A], the maximum deflection of the board shall not exceed 50 mm with a 450 mm cantilever.

6.7 Edge Finish

Edge Finish – Clause 7				
Board	*Specimen*	*Reading*	*Taper Width (mm)*	*Taper Depth (mm)*
B	**1**	(i)	43.0	1.1
		(ii)	43.5	1.2
		(iii)	43.0	1.1
	2	(i)	41.5	1.0
		(ii)	42.0	1.1
		(iii)	42.0	1.1
	3	(i)	45.5	1.1
		(ii)	43.5	1.2
		(iii)	42.5	1.1
		Mean	***42.9***	***1.1***
		Standard Deviation	*1.2*	*0.1*
PASS				

A recessed edge finish shall have a taper depth of 0.8 mm – 2.3 mm (10 mm from the edge of the board) and a taper width of 40 mm – 60 mm, measured as shown in Figure 1 of AS/NZS 2588.

7. SUMMARY

Test specimens prepared from supplied Baier plasterboard complied with the performance requirements of ***AS/NZS 2588*** specified in ***clauses 9.1.2 – 9.1.6*** for 9.5 mm and 10 mm nominal thickness gypsum plasterboard. The measured board thickness and taper profile were also compliant with the specified dimensions of a 9.5 or 10 mm board with a recessed wrapped edge.

8. REFERENCES

[1] Standards New Zealand. AS/NZS 2588:1998 Gypsum plasterboard. Wellington, New Zealand.